



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,789	06/26/2003	Eric J. Bergman	54008.8026.US00	6887
34055	7590	01/27/2005	EXAMINER	
			CARRILLO, BIBI SHARIDAN	
		ART UNIT		PAPER NUMBER
		1746		

DATE MAILED: 01/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/608,789	BERGMAN, ERIC J.
	Examiner	Art Unit
	Sharidan Carrillo	1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 22 November 2004.
 2a) This action is **FINAL**. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-12 and 21-35 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-12 and 21-35 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____ . |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>12/29/2004</u> | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 27 and 35 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The limitations of claims 27 and 35 constitute new matter, the limitations of which are not taught by the original specification. The specification fails to teach the limitations of "without applying any other liquid to the work piece. The specification fails to teach an organic solvent having a density less than the density of the aqueous solution.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 27 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 27 is indefinite for the following reasons. Since it is unclear what

the aqueous solution is, the density cannot be determined and therefore a density of the organic solvent less than the density of the aqueous solution renders the phrase indefinite.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 4-12, 21, 24-26, 28-30, and 34-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Ferrell et al. (5974689).

Ferrell et al. teach a method and apparatus for cleaning and drying a work piece. In reference to claims 1 and 21, Ferrell et al. teach immersing the work piece in an aqueous solution in a process vessel 11, providing sonic agitation into the aqueous solution via transducers 19a, 19b, delivering an organic vapor (HFE or IPA, col. 3, lines 25-30, col. 3, lines 45-50, col. 7, lines 55-60) to a region above the surface of the aqueous solution to create a reduced surface tension (Figs. 3C, 3D, col. 5, lines 40-45), raising the work piece out of the aqueous solution at a controlled rate (col. 7, lines 25-27, col. 3, lines 50-55) and continuing the sonic agitation while the liquid-vapor interface passes across the work piece surface (col. 3, lines 50-55, col. 3, lines 60-65). Additionally, Ferrell et al. teach

withdrawing the work piece from the aqueous solution as the bottom zone of the work piece is still immersed in the solution, wherein the solution is subjected to sonic agitation (col. 6, lines 55-60).

In reference to claims 4 and 8, refer to col. 4, lines 15-17. In reference to claims 5 and 12, refer to Figs. 3C, 3D, and 15. In reference to claim 6, refer to Fig. 1 and col. 7, lines 15-17. In reference to claim 7, Ferrell et al. teach 0.5cm/sec which is equivalent to 5 mm/sec. In reference to claim 9, Ferrell et al. teach using DI water or some suitable liquid (col. 2, lines 60-63. In col. 1, lines 15-20, Ferrell et al. teach chemical baths containing strong acids such as HCl, strong bases NH₄OH, and oxidizers. In reference to claim 10, refer to col. 7, lines 55-62. In reference to claim 11, refer to Fig. 1. In reference to claim 24, refer to col. 4, lines 12-18. In reference to claim 25, refer to col. 7, lines 45-50. In reference to claim 26, refer to col. 3, lines 5-8. In reference to claim 29, refer to Fig. 1, col. 9, lines 60-63. In reference to claim 30, refer to col. 7, lines 25-27, col. 4, lines 59-65. In reference to claims 34-35, refer to col. 7, lines 57-63, col. 6, lines 11-12; col. 3, lines 60-63, and col. 2, lines 19-26. Specifically Ferrell teaches displacing the first liquid by HFE in the cleaning bath. In col. 7, lines 55-60, Ferrell teaches that HFE can be replaced by IPA.

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1, 5-6, 10-12, 21, 25-29, and 31-35 are rejected under 35

U.S.C. 102(e) as being anticipated by Andreas et al. (6273100).

In reference to claims 1, 21, and 31, Andreas teach immersing the work piece in an aqueous solution in a process bath, providing sonic agitation via transducers into the aqueous solution, delivering an organic vapor of IPA to create a reduced surface tension at the surface of the aqueous solution, raising the work piece out of the aqueous solution at a controlled rate, causing a liquid/vapor interface to pass across the work piece surface to dry the work piece and continuing sonic agitations which the liquid/vapor interface passes across the work piece surface.

In reference to claims 5, 12, 25, and 32, refer to Fig. 1. In reference to claims 6 and 26, refer to 28 of Fig. 1. In reference to claims 10, 28, and 33, refer to col. 7, lines 5-7. In reference to claims 11 and 29, refer to col. 8, lines 29-35. In reference to claim 27, the limitations are inherently met since Andreas teaches the same organic solvent as the claimed invention. In reference to claims 32, 34, and 35, refer to col. 3, lines 55-65 and bridging col. 4.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 2-3 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrell et al. (6974689) in view of Danese (6457478).

Ferrell et al. teach the invention substantially as claimed with the step of irradiating the work piece and delivering the organic vapor with a carrier gas.

Danese teaches a method for treating a work piece with UV light. In col. 2-3 bridging, Danese teaches it is conventional in the art to dry the wafer with nitrogen pressurized IPA, as it flows to a sonic head attached to the top of the drying chamber. Additionally, col. 2, lines 20-30, teaches it is well known in the art to use UV light to remove surface contaminants from the wafer surface.

It would have been obvious to a person of ordinary skill in the art to have modified the method of Ferrell et al. to include nitrogen pressurized IPA and UV light, since Danese teaches these steps are conventionally and notoriously used for the treatment of semiconductor wafers. It would have been obvious to a skilled artisan to use nitrogen, as taught by Danese, as a carrier gas during the drying of the wafer surface. Additionally, it would have been with the level of the skilled artisan to have modified the method of Ferrell et al., to include UV, as taught by Danese, for purposes of enhancing removal of contaminants from the wafer surface.

12. Claims 2-3, 9, and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andreas et al. (6273100) in view of Danese (6457478).

Andreas et al. teach the invention substantially as claimed with the step of irradiating the work piece and delivering the organic vapor with a carrier gas. Andreas fails to teach the limitations of claim 9. In col. 5, lines 15-18, Andreas et al. teach that the composition of the bath of chemical cleaning fluid is dependent upon the surface to be cleaned. In col. 9, lines 60-65, Danese teaches conventional aqueous process liquids such as HF, HCl, sulfuric acid, and ammonia.

Danese teaches a method for treating a work piece with UV light. In col. 2-3 bridging, Danese teaches it is conventional in the art to dry the wafer with nitrogen pressurized IPA, as it flows to a sonic head attached to the top of the drying chamber. Additionally, col. 2, lines 20-30, teaches it is well known in the art to use UV light to remove surface contaminants from the wafer surface.

It would have been obvious to a person of ordinary skill in the art to have modified the method of Andreas et al. to include nitrogen pressurized IPA and UV light, since Danese teaches these steps are conventionally and notoriously used for the treatment of semiconductor wafers. It would have been obvious to a skilled artisan to use nitrogen, as taught by Danese, as a carrier gas during the drying of the wafer surface. Additionally, it would have been within the level of the skilled artisan to have modified the method of Andreas et al., to include UV, as taught by Danese, for purposes of enhancing removal of contaminants from the wafer surface. It would have been within the level of the skilled artisan to have modified the method of Andreas to include various chemical cleaning fluids, as taught by Danese, depending upon the type of surface to be cleaned.

13. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Andreas et al. (6273100) in view of Kishida et al. (4643744).

Andreas fails to teach the controlled rate as recited in claim 7. Kishida et al. teach drying the substrate by feeding a drying gas to the substrate during the drawing up of the carrier to remove the wash liquid from the substrate surface. Kishida teach 0.25 to 0.7mm/sec (col. 1-2, bridging). It would have been obvious to a person of ordinary skill in the art to have modified the method of Andreas to include the controlled rate of 0.25 to 0.7mm/sec, as taught by Kishida et al., for purposes of removing the wash liquid from the substrate surface as the substrate is drawn up by the carrier.

14. Claims 4, 8, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andreas et al. (6273100) in view of Ferrell et al. (5974689).

Andreas et al. fail to teach controlling the temperature of the aqueous solution and further fails to teach the temperature as recited in claim 8. In col. 4, lines 15-20, Ferrell et al. teach the temperature of the first processing solution in the range of 10-90 degrees C. It would have been within the level of the skilled artisan to have modified the method of Andreas et al., to control the temperature of the aqueous bath, as taught by Ferrell et al., for purposes of enhancing the removal of contaminants from the wafer surface. Additionally, it is notoriously well known in the art to treat electronic work pieces at room temperature and heat the chemical bath in order to enhance removal of contaminants on the surface of the work piece.

Response to Arguments

15. The examiner agrees with applicant's conclusion that Ferrell teaches a displacement mechanism. However, the claimed limitations read on the teachings of Ferrell. Applicant argues that Claims 1 and 21 describes a Marengo method where the IPA vapor creates a surface tension gradient which pulls liquid from the wafer surface. Applicant's arguments are not persuasive because they are not commensurate in scope with the instantly claimed invention. The claims of 1 and 21 do not recite pulling liquid from the wafer surface. Applicant is arguing the mechanism at which drying occurs. Specifically, applicant argues that Ferrell teaches evaporation of the organic solvent in conjunction to the instant invention, which is directed to drying due to surface tension effects. Once

again, applicant's arguments are not persuasive because they are not commensurate in scope with the instantly claimed invention.

16. Applicant further argues that Ferrell teaches a fog instead of an organic vapor. Additionally, a fog by definition is also considered a vapor. Applicant further argues that Ferrell fails to teach an aqueous solution and an organic vapor. In col. 2, line 63, Ferrell teaches that the first processing liquid may be DI water. Col. 3, lines 30-35 teach HFE which is organic. Col. 3, lines 45-50 teaches the HFE can be in a vapor form. Applicant argues that there is no suggestion of using a DI/IPA mixture. Applicant's arguments are unpersuasive because they are not commensurate in scope with the claimed invention.

17. Applicant further argues that Ferrell fails to teach immersing the work piece in DI water followed by application of an organic vapor in the presence of sonic agitation. Applicant is directed to the abstract and Fig. 2 for example.

18. Applicant further argues that HFE-7100 is not a volatile organic compound. Applicant is directed to col. 5, line 43 which teaches that HFE is fairly volatile.

19. Applicant further argues that Ferrell teaches optional ultrasonic vibration. Applicant's arguments are unpersuasive since applicant is not considering the teachings of the reference as a whole.

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharidan Carrillo whose telephone number is 571-272-1297. The examiner can normally be reached on Monday-Friday, 6:00a.m-2:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on 571-272-1414. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sharidan Carrillo
Primary Examiner
Art Unit 1746

bsc



SHARIDAN CARRILLO
PRIMARY EXAMINER